Solutions to promote digital transformation of construction industry in Vietnam

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Abstract. The 4th industrial revolution is taking place worldwide and has a strong impact on economic, cultural, and social activities. In recent times, digital transformation has become the top concern for businesses in Vietnam in the Industrial Revolution 4.0. According to the National Digital Transformation Program to 2025, with the Prime Minister’s 2030 orientation, the digital economy aims to achieve 20% of GDP by 2050 and 30% of GDP by 2030. In the construction sector, construction accounts for 30-40% of the total social investment capital, which contributes to increasing productivity, increasing the competitiveness of construction products, and is an important resource contributing to national economic development. For construction enterprises, this contributes to improving their competitiveness. Guidelines and policies of the Government and the Ministry of Construction are available, but digital transformation in the construction industry is still slow. The article analyzes the achieved results as well as difficulties and challenges, thereby proposing solutions to promote the digital transformation of the construction industry.

Keywords: digital transformation, construction industry, industrial revolution

1 Introduction

The fourth industrial revolution (4IR) has brought advanced technologies that have the potential to enhance the performance of the construction industry in different ways. Stemming from the guidelines and orientations of the Party and Government on national digital transformation, in July 2020, the Ministry of Construction has issued Decision 1004/QD-BXD approving the "Plan for digital transformation of the construction industry in the period of 2020-2025, with orientation to 2030". The purpose of digital transformation of the construction industry is to contribute to increasing labor productivity, increasing the competitiveness of products, commodities and enterprises in the field of construction, and improving the efficiency of state management in construction.

In the Plan of Digital Transformation of the Construction sector, specific objectives are set:

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(1) Completing the institution to serve the digital transformation of the Ministry of Construction;
(2) Completing the construction and operation of the e-Government of the Ministry of Construction, towards a digital government by 2025;
(3) Completing the digital database system in service of the State management of the Ministry of Construction and localities (such as relevant legal documents; standards and regulations; norms and construction prices; housing, real estate market; construction materials; planning projects; individuals and organizations granted construction practice certificates; specialized construction laboratories; project topics economic career and science and technology career);
(4) Collaborating with localities (focusing on Hanoi and Ho Chi Minh City) on digital transformation in specific areas such as: construction planning management; construction permit management; construction management;
(5) Applying digital technology to promote digital transformation in a number of fields such as: Applying GIS (Geographic Information System) in planning and construction management; Applying BIM (Building Information Modeling) in construction investment activities; Application of digital technology (DT), artificial intelligence (AI) in construction management, Internet of things (IoT) in building operation management, urban infrastructure systems, construction enterprises, building material factory;
(6) Construction industry human resources to meet digital transformation requirements. [1]

Digital transformation of the construction industry in recent times has actively contributed to improving the state management capacity, facilitating the settlement of construction procedures for enterprises.

In 2022, the Ministry of Construction issued Directive No. 02/CT-BXD dated April 6, 2022 on accelerating the digital transformation of the construction industry towards the development of a digital government, digital economy, and digital society requesting important content. Specifically: Building and completing the framework for management and administration of digital data in the Construction industry; Developing an integrated platform, sharing general data; Building and completing the shared data warehouse of the Construction industry; Upgrading and developing digital infrastructure; deploying technical solutions to ensure information safety in connecting information systems and sharing data in service of the Digital Government of the Ministry of Construction; Developing the online meeting and working platform of the Ministry of Construction; Integrating the Ministry's information system to settle administrative procedures with the electronic identification and authentication system; Collaborating with digital technology enterprises to research new and modern technologies in the development of solutions and applications for digital transformation of the Construction industry. [2], [3]

However, the digital transformation of the construction industry is still in the stage of creating digital data, completing information systems for directing and operating, and aiming to provide convenient public services for people, enterprises; there has been no breakthrough in the application of digital technologies to promote the implementation of the development of the digital government, as a foundation for the development of the digital economy and digital society. The connection and sharing of construction digital data resources with national databases and other related specialized databases has been slow to be implemented. [4]

Digital transformation of the construction industry is a long process, construction projects can change according to trends, leading to the construction industry facing difficulties in implementing digital transformation. Therefore, researching and proposing
solutions to accelerate the digital transformation of the construction industry is an urgent issue in the period of 2023-2025.

2 Research methods

Within the limit of a scientific article, in order to get more data and information about the current state of digital transformation, the author has used a data collection method to collect information on digital transformation readiness statistics by sector from the Ministry of Planning and Investment, the Ministry of Construction and other references. Based on the collected data, evaluate, comment and summarize the results.

3 Research results

3.1 Current status of digital transformation

Digital transformation is the integration of digital technologies into all areas of an enterprise, leveraging technologies to change the way businesses operate, business models and provide new values, accelerate business activities and enhance the competitiveness of enterprises. Digital transformation includes the use of software, information system applications, artificial intelligence (AI), cloud computing, etc. to collect, analyze data, automate business processes and manage.

Up to now, digital transformation in Vietnam has been markedly different from previous years. Digital transformation has become a mandatory requirement that businesses need to participate in to thrive and not fall behind. Especially, in the field of construction facing fierce competition, not only among domestic enterprises, but also with the participation of foreign enterprises from countries such as Japan, Korea, China, EU, etc. Economic experts recommend that if businesses do not review, arrange, organize, restructure, quickly update new technologies and techniques to increase labor productivity, improve management methods, etc., they are likely to be eliminated in the competitive field. [2], [3]

According to the survey results of the Enterprise Development Department, the Ministry of Planning and Investment at the end of 2022 with the participation of 1000 enterprises all over the country from many fields of Industry processing, manufacturing, mining, education, construction, real estate, ... The number of enterprises in the field of construction participating in the survey accounted for 5.5%. The result of the need for investment deployment for digital transformation activities of the Construction industry at 2.6 points is between developing and evolved (calculated on a scale of 5: 1 - Basic, 2 – Developing, 3 - Evolved, 4 - Enhance, 5 - Leading).
3.2 Difficulties in digital transformation of construction industry

(1) Difficulties in legal regulations and technical standards

The legal framework has not yet been completed: In the tasks of building a digital database so far, only tasks on the construction industry standards and regulations have been completed; database system on construction norms; database on social housing projects, commercial houses, offices...; database on granting construction practice certificates to organizations and individuals; database of works that have been accepted and put into use; database of construction planning projects. Currently, there is no legal framework to deploy new business and service models to apply digital transformation. The system of legal documents promulgated is not synchronous, not suitable for the requirements of digital transformation. Lack of regulations on data transactions, general database protection, personal data; lack of regulations on personal rights, application of artificial intelligence; regulations on the grant of codes, barcodes, identifiers and formats for unified digital
databases of ministries, branches, localities, etc. The database system of legal documents needs pre-completed, which is the fundament for businesses to apply digital transformation in accordance with the regulations and the proposed order.

- Lack of technical standards including project management standards, big data application standards, transformation process standards, and other standard to measure digital transformation success. In recent years, BIM related standards and norms are being promoted and paid more attention in the construction industry in Vietnam. However, the application of BIM and other technologies such as IoT, AI, ... in Vietnam has many challenges in terms of qualifications, economic capabilities, human resources, software systems, ... In addition, due to the specifics of the construction industry and the complexity and diversity of projects, it is very difficult to establish uniform standards for different technologies and techniques. [4], [6], [7]

(2) Difficulty in implementation capacity

- Financial difficulties: digital transformation projects cost a lot of investment, while the financial capacity of construction enterprises is still limited. Investment in digital transformation includes not only investment costs in digital technology, but also other arising costs such as personnel training costs, investment costs in technical infrastructure, costs of ensuring security for the system, etc.

- Lack of human resources: Achieving digital transformation requires efforts from a variety of technical staff, comprises data analysts, artificial intelligence and specialists, software development engineers. However, the penetration rate of digital skills in the construction sector is still low, leading to a serious shortage of digital talent. The lack of technical personnel can affect data collection, governance, analysis and data usage, therefore hindering digital transformation. The digital transformation in Vietnam still lacks a team of experts and practitioners who are knowledgeable in the field, about the legal system, standards, regulations, unit price norms in construction and administrative procedures... to instruct businesses on the digital transformation sequence.

- Lack of infrastructure: Infrastructure is one of the factors hindering digital transformation. Digital infrastructure including communication system, data center, electronic payment system, etc. Building information modeling BIM is applied in some large enterprises but has not been widely applied to other construction enterprises. According to regulations, the current scope of BIM application is mandatory for first and special grade works of new construction investment projects using public investment capital, foreign state capital for public investment and investment under the mode of public-private partnership. Furthermore, other technical technologies such as IoT, cloud computing, AI, etc. are slower than other industries.

(3) Difficulty in perception and cultural change

- Lack of awareness: Some leaders in state agencies and businesses consider digital transformation not an urgent task. Therefore, they did not invest enough time and effort, leading to delayed implementation of the plan.

- Difficult to change culture: Digital transformation can lead to a complete transformation in the daily work habits of employees and leaders of the business. This leads to a change of role or restructuring the organization and corporate culture in a new direction. Medium and large enterprises with complex apparatus and processes will find have more difficulty in adapting to changes in business habits and methods. With the characteristics of the construction industry, changing culture in the construction environment takes time.
(4) Difficulties in digital technology

- Lack of information about digital technology: Digital technology is diverse, abundant and constantly updated on the demand of the market. Failure to get information about existing technology and its suitability to businesses can make it difficult for businesses to initially apply technology to their production and business activities.

- Data fragmentation: This is the biggest barrier to digital transformation in the construction industry. Existing data in the construction industry can be divided into project data (such as quality, progress, cost, etc.), transaction data (such as bonds and stocks) and public data plus (including government data and social data). These data are from project stakeholders with different expertise and distributed in different systems and platforms, resulting in industry chain data segmentation. This hinders the digital transformation of construction, can lead to data vulnerabilities in a construction project, miscommunication between design and construction; sharing information between different stages will be difficult affecting performance in terms of time, cost and quality. Especially, data is fragmented, thus information about construction projects is easy to be leaked, posing a risk of insecurity. [8]

(5) Catching up slowly with the change

Major market fluctuations such as context, pandemics, etc. put a lot of strains on construction businesses when forced to operate remotely, and even plans and procedures are suddenly changed due to the behavior as well as the habits of customers change. In addition, arising problems such as difficulty in finding customers, not yet being able to leverage the large data warehouses, and the problem of having many projects in need managing at the same time also causes many obstacles for businesses. [9]

As a result, many construction businesses still cannot meet the progress immediately after returning to the new normal state. However, this is a great motivation for them to race hard to regain their previous growth momentum.

4 Discuss some solutions to accelerate the digital transformation of the construction industry

The Vietnamese Government's digital transformation plan has the dual goal of developing the digital government, digital economy, digital society, and forming Vietnamese digital technology businesses with the capacity to reach out to the world. Accordingly, Vietnam's construction industry is not left out.

Based on the challenges, the article proposes several solutions in order to accelerate the digital transformation of the construction industry in the coming time.

(1) Complete the strategy and direct the development of digital transformation in the construction industry

In the development direction of digital transformation of the construction industry, the Government has identified that this as a very important section, needing to focusing on instructing and organizing effective implementation in order to contribute to increasing labor productivity and competitiveness of products, goods and businesses in the construction field, improving the quality of public services of the Ministry of Construction. Nevertheless, it is necessary to have specific plans, appropriate procedures, and determination of the key sections, thus keeping up with the pace of development.

Regarding development strategy: Digital transformation must be implemented generally, comprehensively and synchronously in every areas of the Construction industry. Within the
process of developing strategies, policies, planning, and development plans of the Construction industry, it is necessary to measure and consider integrating these sections as much as possible.

Priorities: (1) Digital database of standards, regulations, norms, and unit prices cater for state management of the Ministry of Construction; (2) Implementing e-Government of the Ministry of Construction; (3) Construction activities (design consultancy; verification and appraisal consultancy; construction and installation; project acceptance); (4) Exploitation and production of construction materials; (5) Construction planning, development of urban and urban technical infrastructure; (6) Housing, offices and real estate market. [10]

Select a number of specific subjects within the scope of State management of the Construction industry to apply scientific and technological achievements to digital transformation, such as application of geographic information systems GIS, construction information model BIM, application of digital technology, artificial intelligence to smart urban operation management, digital businesses; attach smart codes to each construction project. [10]

In addition, developing a general sharing and integration platform for the Ministry of Construction to connect with national databases and specialized databases of ministries, branches and localities to share data, providing online public services cater to people and businesses. [11]

(2) Completing legal policy
It is necessary to focus on completing the legal frameworks on digital platforms and have regulations to ensure the principle of developing platforms capable of interoperability in accordance with technical standards, technical regulations, linkage and data sharing.

The specificity of the construction industry is the management of many projects, with various large and small scales. With the traditional working method, most businesses are using discrete software such as chat via Zalo, send Email, report via Excel, etc. The operation process becomes difficult and lacks links.

Meanwhile, each step, each process and procedure of a construction business needs interaction and connection closely together due to each individual and department. Procedures such as payment, advance, supply of materials, etc. or bidding, which used to take a long time to review and sign for approval from many departments, are no longer a concern of businesses. Just sitting in front of the screen, create a registration form, the process will automatically be sent to the authorities and automatically returned if errors are detected. Employees can totally actively monitor this route, making the process faster and resolving hot spots without much manual effort.

(3) Change in perception
Strengthen information dissemination, gradually change the perception of digital transformation development of the government in general and the construction industry in particular. The focus is on raising awareness about the role and importance of digital transformation for cadres working in the state apparatus and business leaders. Human resource orientation in anticipation of the transformation of traditional working methods by high-level technology.

(4) Digital infrastructure development
For critical infrastructure (data centers, cloud computing centers) the government needs to implement in accordance of plan and gradually improve communication and connection pace, compute and storage capacity, thereby further accelerating the deep integration of digital technology and the construction industry. It is necessary to build a policy to socialize investment capital in this field.
Ensuring safety and network security

Ensuring network safety and security is indispensable in digital transformation. Construction investment projects having the participation of many stakeholders, the data in the project needs to have synchronization and consistency throughout the process from design, construction, to operation. Therefore, software products, information systems, technology investment projects need to be safe to avoid information leakage.

5 Conclusion

Digital transformation of the construction industry contributes to creating a huge surplus value of the country, enhances the competitiveness of domestic and foreign construction enterprises. For the construction industry, deploying digital tools and technologies that harness the power of data to make operations more efficient, productive, and secure. The government has many policies and orientations for the development of digital transformation, but applying it in the field of construction requires determination from the related leaders, ministries and sector. The article presents difficulties and proposes some solutions that can help promote digital transformation in the construction sector.

References